

Laundry to Mulch Basins System

APPLICANT INSTRUCTIONS

- 1) Confirm laundry to Mulch Basin System is appropriate for site
- 2) Draw to scale a plot plan in the space provided labeled "PLOT PLAN," showing:
- a) lot lines and structures
 - b) direction and approximate slope of surface
 - c) location of retaining walls, drainage channels, water supply lines, wells
 - d) location of paved areas
 - e) location of any septic tank, leachfield and 100% expansion area
 - f) location of graywater system [2007 California Plumbing Code (CPC) lists required setbacks]
- 3) Complete Calculations
- Determine design graywater flow and required area:
- | Bedrooms | GPD | Min sq. ft. mulch basin | Min number zones |
|----------|-----|-------------------------|------------------|
| 1 | 30 | 36 | 1 |
| 2 | 45 | 54 | 1 |
| 3 | 60 | 72 | 1 |
| 4 | 75 | 90 | 2 |
| 5 | 90 | 108 | 2 |
| 6 | 105 | 126 | 2 |
- 4) Valves and Piping
- Do not alter washer standpipe trap that leads to septic/sewer
 - Mark Pipe "**DANGER—UNSAFE WATER**"
 - Make diverter valve readily accessible
 - Mark stub-out plumbing permanently
 - Bury supply lines 8" below the surface of mulch or soil
 - Outlet shield floor 17" under the surface of mulch
- 5) Permitting
- See the City of Santa Barbara's, "A Guide to Permitting a Single Family Graywater System", for steps to complete graywater permitting process.

This is a Pilot Program and the the laundry to mulch basin design is new and is, as such, subject to yearly review for safety & effectiveness by the City "Water Resources & Building & Safety Divisions". People commonly attach garden hoses to their washers, or run the laundry water to trash cans and then out garden hoses. There are convenience and effectiveness issues with this practice, which the Laundry to Mulch Basins system addresses. It uses 1" polyethylene (the most ecological plastic) to accommodate the rush of water from the washer, without a surge tank or stressing the pump. Thus, the washer itself pumps water a large distance horizontally, or a short distance vertically, to multiple outlets (six to 18 of), without moving a hose.

Technical Notes—General

1. Graywater systems require a permit. Graywater systems must comply to the standards referenced by the City of Santa Barbara.

Technical Notes—Laundry to Mulch Basins System

2. For a laundry-only system it is not necessary or desirable to change the laundry standpipe (house drain plumbing). The diversion is upstream from this point.
3. Washing machine-pressurized graywater lines must have an inside diameter of 1", and must be covered by 9" of wood chips and/or earth.
4. The minimum number of outlets is six, the maximum per zone 18. (Figure 3)
5. Multiple zones are recommended for high use systems or low perk soil (diverting laundry water to the sewer is an alternative to diverting it to a different zone, so multiple zones are not required).

Figure 1 Notes:

A) Washer Pump Performance and Distribution Plumbing Limitations

Laundry to Mulch Basins systems use the washing machine pump (A, in Figure 1) to distribute the water. Without stressing the pump you can irrigate any distance downhill, or pump up to an elevation 2' below the top of the washer 100' away (100' of horizontal 1" tubing offers the same resistance as 20' of vertical rise). The resistance the pump has to overcome should ideally be about the same as in a standard installation, where the hose discharges at the height of the top of the machine. For example, if a washing machine empties through 100' of 1" pipe that ends 18" lower than its lid, the effective resistance is the same as if it discharged 2" above its lid. At considerably greater risk to the pump, people have irrigated up to 6' above the top of the washer. The variables that affect pump life are:

- Pump model—Higher-quality pumps perform better. Unfortunately, every washer pump is different. The way to determine if the pump is adequate is to try it and see if it burns up.
- Height differential—The less rise, the easier on the pump. Don't go more than 6' up.
- Pipe flow resistance—The pipe should not be less than 1" diameter, and should not kink.

B) Diversion

The laundry diverter valve is usually mounted on the wall behind the washer, or where it is easily visible and convenient to turn. It should be solidly screwed to the wall using copper pipe brackets or plumber's tape, so that it does not move when the handle is torqued. A 1" brass valve is ideal. It is the hardest part to find, but can be ordered through better stocked plumbing supply houses or the internet. One side of the valve diverts water into the standpipe through an air gap, the other through the wall or window to the outside. The graywater destinations should be clearly labeled, eg. "Sewer" and "Orchard." NOTE: If you are doing a load with bleach or fabric softener, send the water to the sewer.

C) Vacuum Breaker

If the first outlet is lower than the level of water in the washer, a vacuum breaker is advised to keep the drain line from continuously siphoning water out of the machine as it tries to refill itself (not a problem with every machine or load, but...easier to just add it). The loose fit of the washing machine drain hose into the standpipe in conventional plumbing creates an air gap, which serves as a vacuum breaker. The vacuum breaker must connect to the main drain line at its high point to be effective. This is typically close to the washer, just outside the house. If the drain line must dip down before leaving the house, it could siphon even with a vacuum breaker outside. In this case, mount the vacuum breaker inside. To avoid the possibility of spillage indoors, you can route a ½" tube from the top of the vacuum breaker outlet back into the septic/sewer drain standpipe. If you're irrigating uphill and the first outlet is above the top of the washer, it will serve as the vacuum breaker.

D) Hose Service Connection Point

A hose service connection makes tuning the outlets easier (you won't have to keep doing load after load of laundry to check and tune outlet flows). It is also good for blowing out lint, if needed (be careful to not pressurize the system too much as the irrigation tubing connections cannot handle more than about 20 psi (140 kpa). The hose service connection must be properly installed so there is no chance of graywater backflowing into the freshwater lines. The layers of protection against this are: 1) to connect the hose, the washer must be disconnected; 2) the swing check valve (below); 3) a backflow prevention device at the hose bibb. To tune the outlets perfectly, check the flow from the washer by timing how long it takes to fill a bucket. Then adjust the hose to the same flow. Do not leave the hose connected unless testing or cleaning the lines.

E) Backflow Prevention Valve

If the drain line runs (or can be lifted) above the height of the top of the washer, a swing check valve should be included as close as possible to the washer, to keep water in the line from rushing back into the machine when it shuts off. Get a clear one with 1" pipe thread—a clean installation and you can watch what is happening inside. If you have a hose service connection, a swing check valve adds backflow protection.

F) Distribution Plumbing

To get the pressurized graywater to plants, 1" polyethylene tubing is the preferred distribution plumbing. This is the same material commonly used for drip irrigation, just in a bigger size. Use the kind with a purple stripe to indicate non-potable water. Smaller tubing gives too much resistance. Bigger tubing traps more septic water and solids. PVC pipe is more toxic and less attractive. You can run a single or multi-trunk line, with or without valves or branches. Branches can be 1", ¾", or ½" drip tubing. With lots of graywater and/or low-perk soil, use two or more valved zones (Figure 2). All the plumbing must be under 9" of mulch and/or soil for a legal system. Be sure to note the location of hidden plumbing on a drawing or photographs for your house files. It is best for freezing, smells, and the pump if the line slopes downhill continuously. Second best: a U-shaped line with an outlet at the low point to drain the U. However, because the line is pressurized, it can dip up and down. The consequence is some trapped water in the line between uses. Unless the line might freeze, this is acceptable. The water can go septic if it sits for more than a few days. However, the quantity in even a long run of 1" pipe is so small that any objectionable smell is only detectable for the first moment of discharge. In an installation that includes both some rise and a long horizontal run, the quantity of trapped water is minimized by sending the pipe up to the maximum height as quickly as possible, then running the pipe down from there. This way, most of the run drains dry after each use. This same geometry works to get the water up from a basement washer to the yard.

G) Outlets

There are several options for outlets (Figure 3). The capacity of all the outlets should be enough that the pump is not strained trying to push too much water through too small or too few holes. On the other hand, too many or too large holes will result in pressure loss that may leave some outlets high and dry. The total cross-sectional area of all the outlets in a zone should be between 1-2 in2 (the free Laundry to Mulch Basins Calculator at www.oasisdesign.net/grawater/laundry can be used to find the total cross-sectional area from a variety of outlets). Note that outlet flow in this pressurized system, unlike a gravity flow system, depends on the height, the size, and the number of outlets, as well as the length and diameter of the tubing. You can tune the flow by making the outlets different sizes, or adjusting the outlet ball valves. If you are irrigating uphill, the first outlet will get way more water than the last outlet. To avoid this, run a solid line to the high point, then do a U-turn and put all the outlets in the downhill run.

H) Receiving Landscape

Mulch basins are the preferred way to recieve graywater into the landscape. Mulch basins increase soil percolation, reduce rain runoff, reduce water use, increse soil fertility, and ease stress on landfills. Form them to a minimum of 9" deep, with 9" mulch. "Mulch" is organic waste material includin leaves, prunings, straw, pulled weeds, and wood chips. It is recommended to put woody mulch near the bottom of mulch basin because it is more durable and permeable.

Not every installation may require a vacuum breaker, check valve, or hose service connection. But, if you include the applicable components, the chance of having trouble with your system is much smaller, and including all of them won't hurt.

PLOT PLAN

Figure 1: Laundry to Mulch Basin System

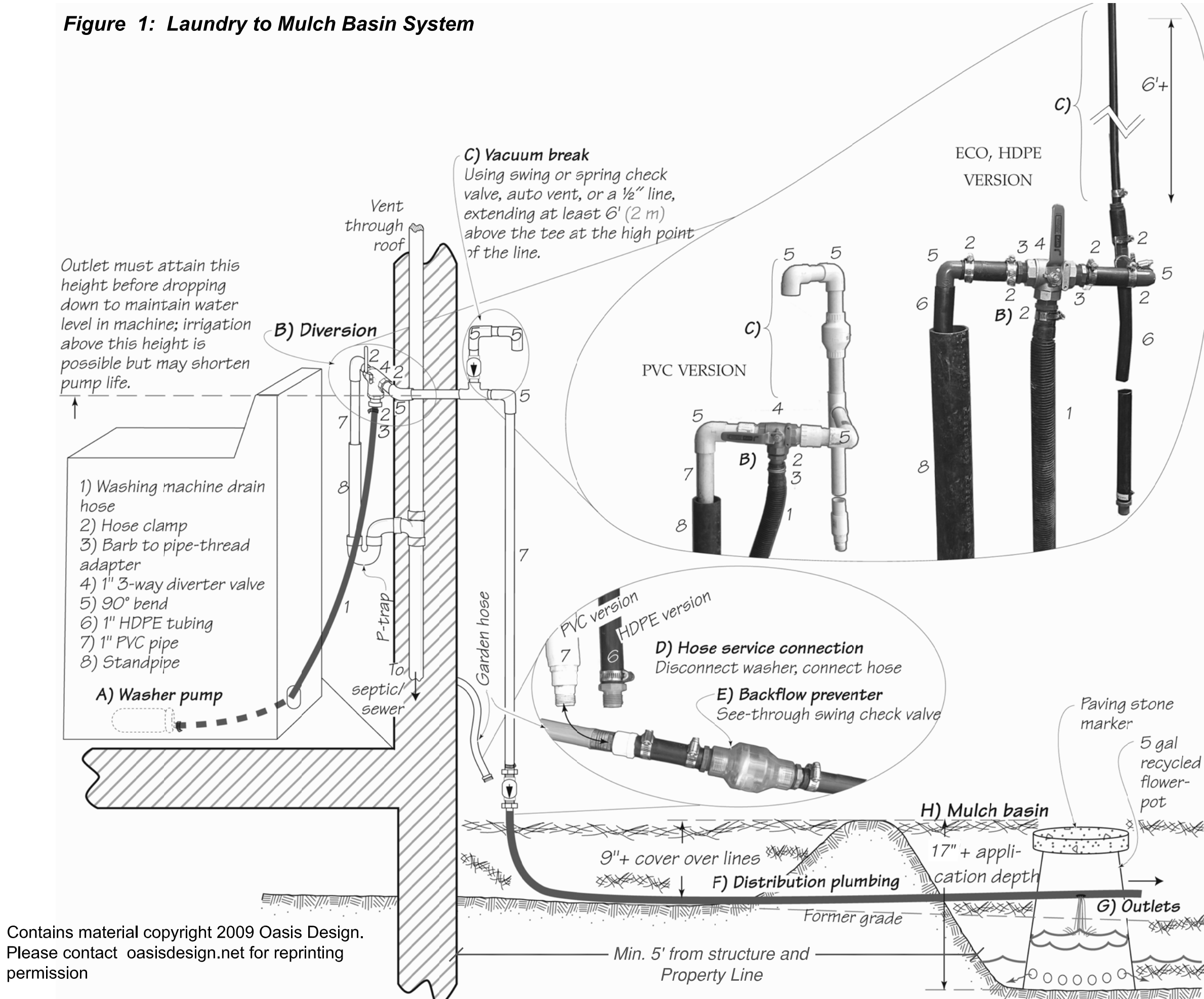


Figure 2: Outlet Options

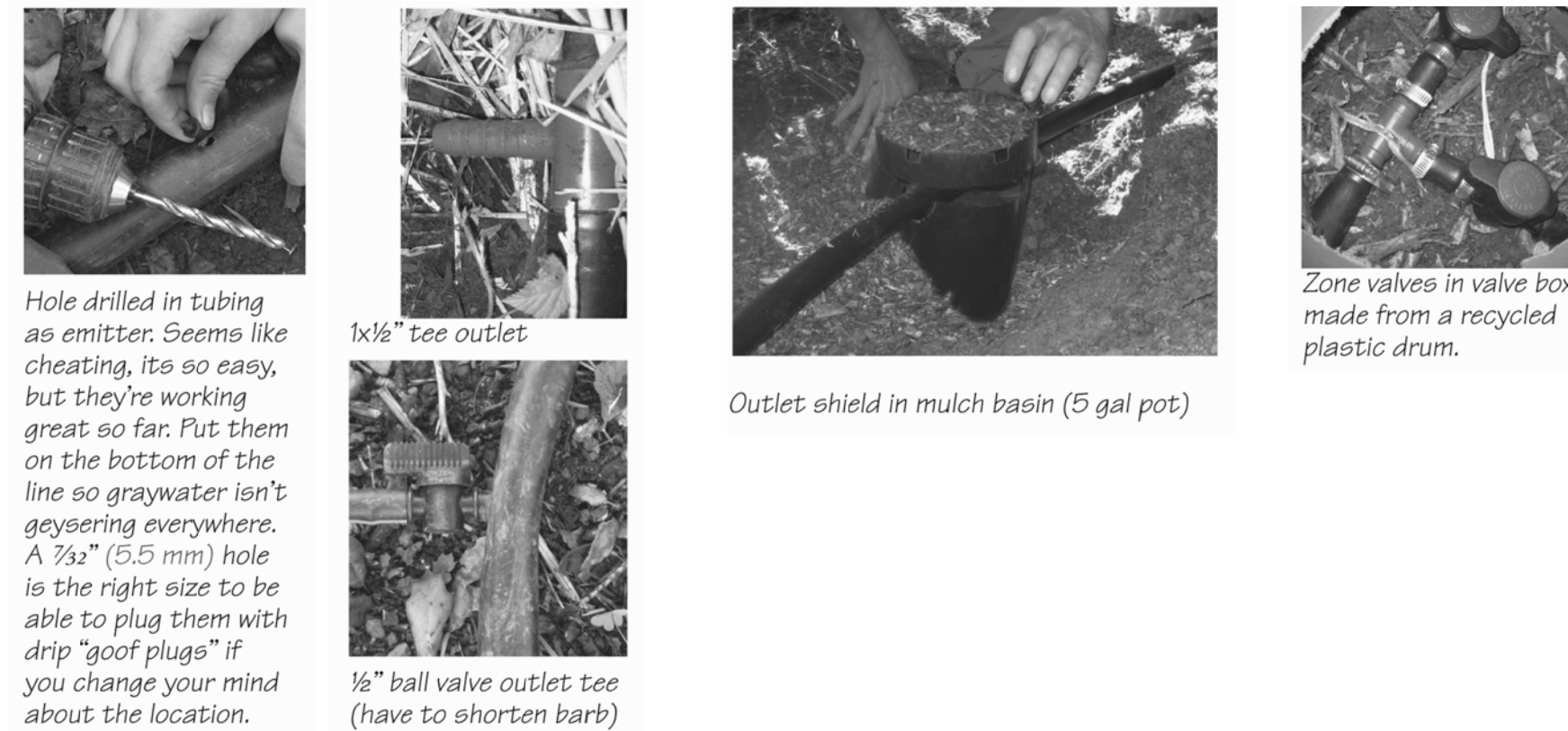
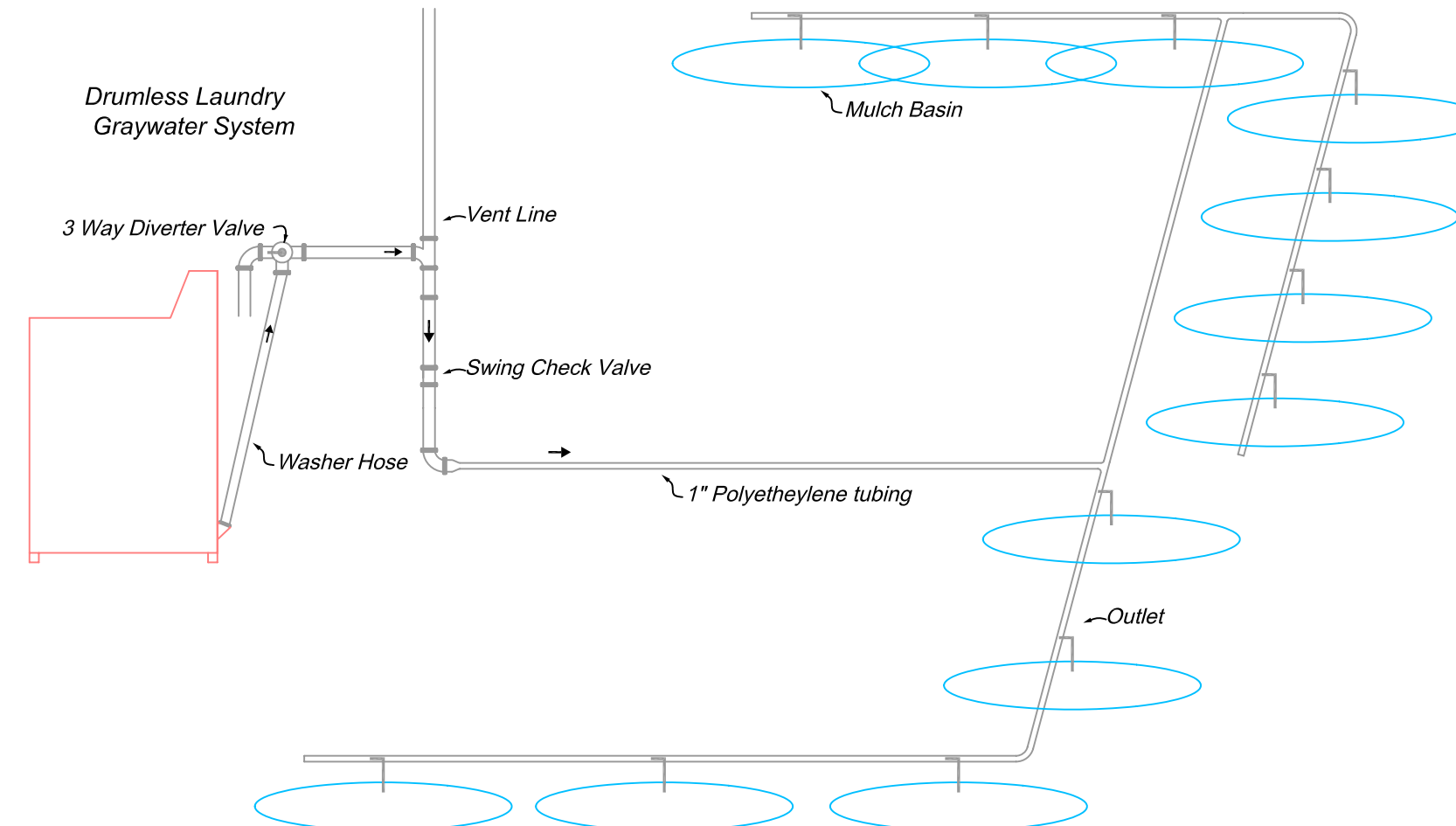


Figure 3: Sample System in Plan View



Purpose

The intent of this code compliance package is to promote water conservation by providing a model installation plan to help streamline the permit process for a safe, effective and code compliant graywater collection system. (Graywater is all household wastewater except for toilet water, kitchen sink water, and diaper-laundring water.)

CITY OF SANTA BARBARA

Laundry to Mulch Basin System

Graywater Collection System - Pilot Program

Scope

This design sheet clarifies and standardizes the application of the State of California Graywater Standards in the City of Santa Barbara for a simple, laundry only graywater system. Other graywater systems may be permissible. For example, branched drain systems, and sand filtration to subsurface drip irrigation, which is good for new construction and high graywater flows, and is generally professionally installed.

PERMIT # _____

SHT. _____ OF _____ SHTS.

APPROVED _____